GSAS v3.9 Release Notes

Raytheon/JLee & GLAS Team

May 5, 2004

Introduction

GSAS 3.9 contains additional functionality for GLA04 L1A, significant improvements in Atmosphere processing, improvements in waveform computations, and significant improvement in Quality Assessment functionality.

For L1A, the following changes were made:

- Improved GLA03 Quality Assurance Product (QAP).
- Improved GLA04 Gyro time tagging.
- Implementation of GLA04 LRS tracker data swap logic.
- Addition of 6 temperatures to the GLA04_LRS product.
- Implemented 532 background as a function of height.
- Flag set to indicate SPCM off condition.

For Waveforms, the following changes were made:

- Potentially improved fitting of saturated waveforms. Constants were modified for both standard and alternate fitting. Some code changes made for alternate fitting.
- Improved QAP05.
- Fixed bug in number of peaks used.
- Optional processing for saturated waveforms. These options are currently disabled for operations.

For Atmosphere, the following changes were made:

- Substantially improved PBL height retrieval (GLA08).
- Improved cloud layer detection from 1064 channel.
- Implemented a time dependent calibration for 1064

Other, more general fixes include:

- More protection for floating point exceptions.
- Documentation corrections.
- Across the board QAP and browse improvements.

Product Format/Definition Change Summary

GLA01:

i_RecNrgAll_EU - changed max value

i_RecNrgLast_EU - changed max value

GLA03:

Replaced existing spare55 with:

CD_PWaccum i4b(4)

CD_PWlong i1b(4)

CD_PWshort i1b(4)

CD_PWmsb i1b(4)

changed spare55_4 to i1b(1,4)

GLA04_LRS:

lrs_flag - added bit 5

lrs_flag - added bit 6

Replaced 12 spare bytes with six 2-byte temperatures as follows:

i_lrs_spare1 (i2b) (byte offset 482) changed to i_LPAC13_t1 (i2b)

i_lrs_spare2 (i2b) (byte offset 1114) changed to iF1LTRSRSC26_t (i2b)

i_lrs_spare3 (i8b) (byte offset 6368) changed to iF2LTRSRSC27_t (i2b), i_TsPMir_t (i2b), i_TsSMir_t (i2b), i_srs_ff_optics_t (i2b)

GLA05, 06, 12-15:

i_PADPoint - long description change

i_PODFixedPos - long description change

WFqual - Description change to bits 16 and 17

i_ldElv - load tide description change

GLA13:

i_BergElev - description change (GLA13)

GLA14:

i_TrshRngOff - replaced by i_SigBegOff (GLA14)

ANC13 (Ancillary file):

anc13 (Geoid) - add description

ANC33 (Ancillary file):

Added two new fields:

d_siru_e (the initial slope for the SIRU VTCW correction).

d_siru_e2 (the secondary slope for the SIRU VTCW correction).

The latest product formats/descriptions will be available at http://glas.wff.nasa.gov/v39_products/.

Known Problems

GLA16 still not supported.

Additional parameters need to be added to QAP03.

Some ANC45 metadata changes are outstanding.

More investigation into processing of saturated waveforms is needed.

High definition DEM needs to be integrated into the GSAS code.

532 background for bright daylight scenes still not 100% correct. This causes the data to be poorly calibrated which affects all L2 results.

Cloud/aerosol discrimination for polar latitudes incorrect. Many clouds are labeled as aerosol in polar regions. Elsewhere classifications are better, but not perfect (espically for multiple layers where lower layer is attenuated by upper layer).

The quality flag for PBL height should be >= 2 to insure a viable PBL height retrieval.

Clouds detected from the 1064 channel may actually be aerosol layers (no 1064 cloud/aerosol discrimination has been implemented as yet).

QAP05 lists all waveforms as always valid – this is a mistake- probably in the total number of waveforms.

Lots of other QA tweaks needed.

Release Information

The ClearCase label for this release is RELEASE_3.9.

The release date is May 5, 2004.

Version numbers have been updated to “V3.9 April 2004" for the following:

- lib_atm
- lib_l1a
- lib_wf
- lib_elev
- lib_anc
- lib_cntl
- lib_file
- lib_math
- lib_platform
- lib_prod
- GLAS_L1A
- GLAS_Alt

- GLAS_Atm
- GLAS_Meta
- GLAS_Tick
- anc07_00
- anc07_02
- anc07_04
- anc07_05
- anc45_01-15

This should be verified during operation by checking the version information in the appropriate ANC06 files.

SMDS Impact

The distribution tarfile is on glasdev.wff.nasa.gov at the following location:

```
/glasdev1/v3/dist/gsas_V3.9.tar.Z.
```

ANC Files

New versions of the ANC07_00, ANC07_05, and ANC45 data files are required. A new ANC33 file with appropriate field additions is also required.

ANC07/01 global constants file should be an input to CreateGran_util and RefOrbit_util. The keyword is IN_ERRORFILE=.

Compilation

All libraries and binaries should be recompiled using the top-level Makefile. **IMPORTANT: due to internal changes in the makefiles, SDMS MUST use the command "make runtime" to ensure the software is made without debug flags.**

The process for making the libraries and binaries is as follows **(NOTE: SDMS ONLY!!)**

```
cd /install_dir/gsas_v3.9
make runtime
make install
```

Note : developers should not use the above procedure. This procedure is for SDMS only!

Detailed Change Notes

0001493: reforbit_util and createGran_util are not using the ellipsoid

Reforbit_util and createGran_util were modified to read in the ellipsoid parameters from the global constants file. This change affects ANC22, ANC28, and ANC43.

NOTE: SDMS will be impacted by this change.

ANC07/01 global constants file should be specified in the control file with keyword IN_ERRORFILE=.

0001488: Update F90 "SCF" readers for rel 17

Updated SCF readers to reflect Release 17 product changes.

0001485: GLA04-02 LRS needs temperature data added

6 temperature values were added to the GLA04 LRS product. These are: i_LPAC13_t1 (Laser Profiler Array (LPA) Temperature 1 Ch 13), iF1LTRSRSC26_t (PRT, Face 1 LTR to SRS Temperature Ch26), iF2LTRSRSC27_t PRT (Face 2 LTR to SRS Temperature Ch27), i_TsPMir_t (Telescope Region 0 Primary Mirror Temperature), i_TsSMir_t (Telescope Region 1 Secondary Mirror Temperature) and srs_ff_optics_t (SRS First Fold Optios Temperature).

0001455: Change def of bit in i_elvFlg

Changed definition of i_ElvFlg for bit 7, "TBD" changed to "1 = Gain > flag value, indicating probable cloud contamination"

0001453: Add code to L1A Mgr which skips unneeded data

Added code which skips data processing till 1 minute before the earliest output time.

0001452: SCF product readers readme update

SCF Product Readers "README" file was updated to remove references to the SCF website.

0001443: Units/scale error in GLA05 product description

Corrected documentation regarding scales and units for d_parm and d_solnSigmas.

0001435: Update ANC45 Release Number and Version Description

Updated the VersionID in the ANC45 files to 17. Updated the Version Descriptions as follows:

For products GLA01-GLA05, GLA07-GLA11 = "GSAS version 3.9, Geoid reference to TOPEX, POD version 5, PAD versions differ, see release notes"

For products GLA06, GLA12 -GLA15 = "GSAS version 3.9, Geoid updated to be referenced to same ellipsoid as elevation, POD version 5, PAD versions differ, see release notes."

0001423: An Array in W_CharTrPulse Has Wrong Dimension

In W_CharTrPulse, d_trTime(giMxGates) was corrected to be d_trTime(giMaxTrGates) .

0001416: Change QAPG to conform with Mantis 1257 and 1344

The definitions of two flags in L_WFQual (which is in the product files for GLA05, 6, and 12-15) was changed. The invalid wf flag is set only if the waveform is fill. The no signal flag is set only if there IS a waveform (not fill) which is never above threshold.

0001406: QABrowse CATCH block commented out

QABrowse should now correctly report an exit status.

0001405: Definition of load tide inaccurate

Description corrected to say: " The load tide elevation applied to each shot. Element i (i=1,4) is applied to the ten shots 10*i-9 to 10*i (1-10, 11-20, etc.)."

0001401: Definition change in L_WFQual flag

The PDF description has been changed on bits 16 and 17 for the WFQual flag in GLA05.

0001398: QAP06 browse problems in Release 16.

No description of fix provided.

0001396: HDF files for GLA02 and GLA05 are blank

This required coordinating the release number in the control file.

0001371: Need gi_fname_len increased from 80 for SCF

Increased the maximum filename length to 255.

0001366: ANC32 roll logic fails when processing multiple days in one job

The rollover logic for ANC32 was fixed to handle processing multiple days in a single job.

0001355: PAD and POD long description documentation change

(changes are in caps)

i_PADPoint Description: Unit vectors giving the pointing direction of the laser with respect to the GLAS optical bench axes in the ICRF reference frame, one vector for each of the 40 shots, AT THE SHOT (TRANSMIT) TIME. Each component is composed of 2 4-byte items.

i_PODFixedPos Description: Spacecraft position vectors in ICRF of the laser point of reference on the spacecraft, one vector for each of the 40 shots, AT THE BOUNCE (TRANSMIT PLUS TRANSIT) TIME. Each element is composed of 2 4-byte items. The first is m and the second is millimeters.

0001344: Change definition of nosignal flag in L_WFQual

The definitions of two flags in L_WFQual (which is in the product files for GLA05, 6, and 12-15) was changed. The invalid wf flag is set only if the waveform is fill. The no signal flag is set only if there IS a waveform (not fill) which is never above threshold.

0001340: Update QABrowse and read s/w for changes to QAP03

QABrowse was modified to handle new QAP03 summary data record format.

0001339: GLAS_Atm bombs in c_beam_sun_ang

Problem happens when range to peak of return is invalid for a few records at the very beginning of the GLA02 file. The d_spot_elev parameter had not been initialized and contained random information, causing the Beam_sun_ang module to hit an overflow. The same issue occurs later in the data set, but an old (and incorrect) value of d_spot_elev prevented an abnormal ending. The ATM Mgr has been modified to fix the error.

0001327: Add documentation to onepass_average_mod.f90

Added internal documentation to onepass_average_mod.f90

0001287: Release 15 L_Atm is generating errors at 40/sec rate

The fix was to put the 532 processing code in an if block that is tested for the number of SPCM's enabled. If this value is < 1, a call to GLAS_Error is made (at once per second) and the 532 processing code is not executed. This will mean that when the SPCM's are not enabled, the 532 data produced by L_Atm_mod (GLA02) wil be invalid. Prior to this change, the data would have been no good, but most likely not invalid (possibly all zeroes).

0001288: Write_L1A gives confusing error message

Fixed an error where Write_L1A reports g_time in the error instead of the time actually being checked.

0001268: PBL Height / Elevated Aerosol Layer Detection Enhancement

GLA02%i_g_IntRet calculation fixed.

False positives for aerosol layer heights above 20 km reduced/eliminated.

Improved 1064 calibration via a time dependent calibration coefficient based on offline analysis of 532 and 1064 backscater from cirrus clouds and ER-2 validation under flight comparisons.

Improved 1064 cloud layer detection at 1 and 4 second resolution. Reduction in false positive occurrence.

Processing (Level 2) of 532 channel is turned off when the data quality is severely reduced due to low laser energy and high background, but 1064 processing continues.

Much improved Planetary Boundary Layer (PBL) height retrievals. Reduction of false positives and the refinement of the PBL quality flag (1-14, where 14 is highest quality or highest confidence).

Elevated aerosol layers that were reported at or below the PBL top have been eliminated

Improved cloud/aerosol discrimination

Error in flag packing for GLA10 and 11 corrected and excessive calls to GLAS_Error on divide by zero condition eliminated (Mantis 1094 problem report).

Excessive calls to GLAS_Error when SPCM's are not turned on eliminated (Mantis 1287 problem report)

Turned on flag to eliminate calibration points calculated during daylight.

0001260: GLA10 and 11 Atmospheric Data Product Refinement

A_aer_opt_prop

* changed decision tree for tropospheric and stratosphere layer determination

* labeled lower_aerosol layer loop for clarity

* reset backscatter and extinction profiles to prior settings after call to A_forward_inversion for msf purposes only (2 occurances, helps saturation settings)

* eliminated need to call GLAS_ERROR during 1-sec, 4-sec, and 20-sec att. bs profile averaging and sdev

* set optical depth of layer to invalid if any extinction in layer is invalid

* changed saturation check from (i_index .lt. 5) to

(i_index .ne. 1) due to change in SPalm's GLA07 output

A_aer_inits

* modified aerosol and cloud sval use flags so both are initialized as 15

A_cld_opt_prop

* fixed integer overflow condition in aerosol layer above cloud algorithm

* d_cld_trans was wrongly indexed with i_c, changed to i_t

* Set optical depth for layer to invalid if any extinction in layer is invalid

A_forward_inversion

* Eliminated need to call GLAS_ERROR routine when calculating d_xval

* Added more validity tests to inputs of inversion loop

* Set optical depth to invalid if i_flag > 0

A_opt_thin

* Changed thresholds of realistic Sratio from 1 <= S <= 130 to 5 <= S <= 120

* Changed SNR threshold d_snr_thresh from .40 to .25

A_backward_inversion

* Added checks for out of bounds conditions on variables

Constants

* Changed gd_trans_lbnd from .12 to .01

0001257: QA05 # valid returns looks odd

The % valid is now below 100 and showing different values for alternate and standard parameterizations.

0001244: QAP03 Percent Missing Data has negative values

QAP03_mod was modified to make Percent Missing Data be equal to zero if the value was negative. Negative values were being received because the actual number of apid's was more than the expected. A call to GLAS_Error was also added when more than one packet per apid was processed over the number expected.

0001228: Add gain flag to GLA06,12-15

Added gain flag to GLA06, 12-15.

0001186: LRS Subject change

Implemented code to detect when VT0 tracks the wrong image. The code detects the mistracking and swaps the appropriate data. The detection algorithm and associated constants were provided by the instrument team.

0001053: Elev Mgr error in calc of N final peaks for QAP06

Fixed a problem where number of alternate peaks was used instead of number of standard peaks.

0000840: Release 12 GLA06,12-15 problems discovered in QA data

Various problems were fixed the the GLA06, 12-15 QA.

0000767: Examine alternate fitting for saturated wavefroms

Special Processing:

Changed fitting procedure to use a different method to fit (standard parameters only) waveforms that have saturation (this method conserves the total area of the waveform measured above the noise from signal begin to signal end). For version 17, this special processing method has been turned off by setting I_USEHS_PROC in anc07_001_01_0004.dat to 0.

I_USEHS_PROC may also be set to 1 to apply special processing only to low gain saturated waveforms (standard only); 2 to apply special processing only to high gain saturated waveforms (standard only); or 3 to apply special processing to any saturated waveforms (standard only).

Normal Processing:

The following changes were implemented for both normal and special processing.

767: Implemented laser-dependent criteria for determining high and low gain saturation. In anc07_001_01_0004.dat, updated D_SATUR_NRG (Min Echo pulse energy in femto-joules to imply low gain saturation) from 15.0D-15 to 11.0D-15.

1127: Changed the way the peak sigma is constrained during the fitting process. Fixed calculation of second-try estimated sigma. Fixed logic so that if the first fit failed, and if there was a second-try estimate, then a second fit was attempted. Removed some variables that are no longer used.

1423: Corrected array dimension in W_CharTrPulse.

0000486: SIRU (GYRO) sample time is not correct

The GYRO sample time computation is improved by including the siru time tag and performing a "sync" with the internal clock.

0000468: Implement QAP03 Granule stats

The Granule statistics below were implemented in QAP03_mod.f90

Implement the following granule stats(max,min,avg,stdev) for:

-the difference between the laser fire command time and the laser fire acknowledge time.

-the difference between the spacecraft time (BVTCW) of the spacecraft time and position packet and the GLAS MET of the spacecraft time and position packet.

-sum of the Post-Delay pulse waveform bin values(32 bins); average and stdev only

-the peak of the Post-Delay laser pulse

-the pulse width of the Post-Delay laser pulse

-the peak of the four OTS laser pulse

-the pulse width of the four OTS laser pulse

The QAP03 file lists these at the bottom of the summary statistics section.

Changed ANC07 Parameters:

ANC07_02

changed GD_CC_NUM_STD from 1.3d0 to 2.0d0.

changed GD_DISCRIM_THR (array of values).

changed GD_IR_LMCALCOF from 4.20d1 to 5.20d1.

changed GD_PBL_THR_FTR from 0.30d0 to 0.40d0.

changed GI_CC_ELIM_F from 1 to 0.

ANC07_04

replaced saturation parameters D_PSAT_STOP1, D_PSAT_STOP2, D_PSAT_SPEC1, and D_PSAT_SPEC2 with I_USEHS_PROC, D_AALPHA, D_ABETA, and D_AGAMA.

changed I_OFFSETB1 from 12 to 50.

changed I_OFFSETB2 from 10 to 50.

changed I_OFFSETE1 from 12 to 50.

changed I_OFFSETE2 from 10 to 50.

replaced I_SATAMP with I_SATAMP1, I_SATAMP2, and I_SATAMP3.

replaced I_SATUR_GAIN with I_SATUR_GAIN1, I_SATUR_GAIN2, and I_SATUR_GAIN3.

replaced D_SATUR_NRG with D_SATUR_NRG1, D_SATUR_NRG2, and D_SATUR_NRG3. (Changed value from 15.0d-15 to 11.0d-15)

replaced D_MINNRG_SAT with D_MINNRG_SAT1, D_MINNRG_SAT2, and D_MINNRG_SAT3.

replaced I_MAXGAIN_SAT with I_MAXGAIN_SAT1, I_MAXGAIN_SAT2, and I_MAXGAIN_SAT3.

replaced D_WIDTHPK_SAT with D_WIDTHPK_SAT1, D_WIDTHPK_SAT2, and D_WIDTHPK_SAT3.

replaced D_MINSKEW_SAT with D_MINSKEW_SAT1, D_MINSKEW_SAT2, and D_MINSKEW_SAT3.

changed D_V0NS1 from 0.1d0 to 1000000.0d0.

changed D_V0NS2 from 0.1d0 to 1000000.0d0.

added D_AREAV0 = 0.1d0

added d_GainAlertLevel = 30

ANC07_05

changed GD_NRG_THR1 from 1.0D-3 to 0.5D-3.

changed GD_GYRO_TIME_LAT from 0 to 0.001763d0

Added GD_LIM_VT1CENTR = 850.0d0 920.0d0

Added GD_LIM_VT1CENTC = 850.0d0 900.0d0

Added GD_LIM_VT2CENTR = 930.0d0 975.0d0

Added GD_LIM_VT2CENTC = 1175.0d0 1215.0d0

Added GD_VAL_VT1CENTR = 830.0d0 950.0d0

Added GD_VAL_VT1CENTC = 820.0d0 950.0d0

Added GD_VAL_VT2CENTR = 900.0d0 1060.0d0

Added GD_VAL_VT2CENTC = 1100.d0 1260.0d0

Added GD_LIM_VT1NRG = 1500.0d0

Added GD_LIM_VT2NRG = 75.0d0

Added GD_LIM_VTC_RATE = 8.0d0

Added GD_LIM_VTR_RATE = 8.0d0

Added GD_LIM_VT_SWAP_T = 2.0d0

Added GI_DC_OFFSET = 30

Changed Files:

```
./Makefile
./data/anc07_001_01_0000.dat
./data/anc07_001_01_0002.dat
./data/anc07_001_01_0004.dat
./data/anc07_001_01_0005.dat
./data/anc45_001_01_0001.dat
./data/anc45_001_01_0002.dat
./data/anc45_001_01_0003.dat
./data/anc45_001_01_0004.dat
./data/anc45_001_01_0005.dat
./data/anc45_001_01_0006.dat
./data/anc45_001_01_0007.dat
./data/anc45_001_01_0008.dat
./data/anc45_001_01_0009.dat
./data/anc45_001_01_0010.dat
./data/anc45_001_01_0011.dat
./data/anc45_001_01_0012.dat
./data/anc45_001_01_0013.dat
./data/anc45_001_01_0014.dat
./data/anc45_001_01_0015.dat
./idl/qa_browse/browse
./idl/qa_browse/browse/qab03.pro
./idl/qa_browse/browse/qab03_summary.pro
./idl/qa_browse/browse/qab05_groundtrackmaps.pro
./idl/qa_browse/browse/qab05_histograms.pro
./idl/qa_browse/browse/qab05_writetabletoplot.pro
./idl/qa_browse/browse/qab06_gndtrkpage.pro
./idl/qa_browse/browse/qab06_lowerlevelplots.pro
./idl/qa_browse/browse/qab06_upperlevelplot.pro
./idl/qa_browse/browse/qab13and15_lowerlevelplot.pro
./idl/qa_browse/browse/qab_bar__define.pro
./idl/qa_browse/browse/qab_barchart.pro
./idl/qa_browse/browse/qab_gndtrkmap.pro
./idl/qa_browse/browse/qab_plotelevadjustments.pro
./idl/qa_browse/browse/qab_plotelevbars.pro
./idl/qa_browse/browse/qab_readcntlfile.pro
./idl/qa_browse/browse/qab_tripleplot.pro
./idl/qa_browse/browse/qab_tripleplotpage.pro
./idl/qa_browse/browse/qabrowse.pro
./idl/qa_browse/browse/sample.txt
./idl/qa_browse/compare/qapc_inprod_summary_V3.pro
./idl/qa_browse/compare/qapc_metadata.pro
./idl/qa_browse/compare/qapcompare.pro
./idl/qa_browse/compare/sample.txt
./idl/qa_browse/read
```

./idl/qa_browse/read/qapr_qap03sumrecfix.pro
./idl/qa_browse/read/qapread.pro
./idl/qa_browse/util
./idl/qa_browse/util/hdf2images.pro
./idl/qa_browse/util/hdf2png.pro
./idl/qa_browse/util/qa_consts.pro
./idl/qa_browse/util/qap03V2_datastruct.pro
./src/atm_lib/vers_atm_mod.f90
./src/atmosphere/backscat/A_bscs_mod.f90
./src/atmosphere/backscat/A_cal_cofs_mod.f90
./src/atmosphere/common/A_buff_data_mod.f90
./src/atmosphere/layers/A_1s_1064_det_mod.f90
./src/atmosphere/layers/A_20s_1064_det_mod.f90
./src/atmosphere/layers/A_4s_1064_det_mod.f90
./src/atmosphere/layers/A_4s_aer_det_mod.f90
./src/atmosphere/layers/A_aer_lays_mod.f90
./src/atmosphere/layers/A_cld_det_mod.f90
./src/atmosphere/layers/A_cld_grd_det_mod.f90
./src/atmosphere/layers/A_cld_lays_mod.f90
./src/atmosphere/layers/A_lays_1064_mod.f90
./src/atmosphere/layers/A_pbl_det_mod.f90
./src/atmosphere/layers/A_pbl_lay_mod.f90
./src/atmosphere/opt_props/A_aer_opt_prop_mod.f90
./src/atmosphere/opt_props/A_cld_opt_prop_mod.f90
./src/atmosphere/opt_props/A_opt_thin_mod.f90
./src/common_libs/anc_lib/ANC07_mod.f90
./src/common_libs/anc_lib/anc07_l1a_mod.f90
./src/common_libs/anc_lib/anc07_wf_mod.f90
./src/common_libs/anc_lib/anc32_gps_mod.f90
./src/common_libs/anc_lib/anc33_utc_mod.f90
./src/common_libs/anc_lib/anc_hdr_mod.f90
./src/common_libs/anc_lib/vers_anc_mod.f90
./src/common_libs/cntrl_lib/fStruct_mod.f90
./src/common_libs/cntrl_lib/ver_cntrl_mod.f90
./src/common_libs/exec_lib/fCntl_mod.f90
./src/common_libs/exec_lib/vers_exec_mod.f90
./src/common_libs/file_lib/OpenFInFile_mod.f90
./src/common_libs/file_lib/ver_file_mod.f90
./src/common_libs/math_lib/onepass_avg_mod.f90
./src/common_libs/math_lib/vers_math_mod.f90
./src/common_libs/platform_lib/const_atm_mod.f90
./src/common_libs/platform_lib/const_glob_mod.f90
./src/common_libs/platform_lib/const_l1a_mod.f90
./src/common_libs/platform_lib/const_wf_mod.f90
./src/common_libs/platform_lib/vers_platform_mod.f90
./src/common_libs/prod_lib/GLA00_mod.f90
./src/common_libs/prod_lib/GLA04_alg_mod.f90
./src/common_libs/prod_lib/GLA04_prod_mod.f90
./src/common_libs/prod_lib/GLA04_print_mod.f90
./src/common_libs/prod_lib/GLA04_scal_mod.f90
./src/common_libs/prod_lib/GLA10_flags_mod.f90
./src/common_libs/prod_lib/GLA11_flags_mod.f90
./src/common_libs/prod_lib/common_flags_mod.f90
./src/common_libs/prod_lib/vers_prod_mod.f90
./src/createGran_util/createGran_util.f90
./src/createGran_util/rd_GranCntrl_mod.f90
./src/create_dem
./src/create_dem/maker_SRTM_trks/maker.f90

```
./src/elev_lib/vers_elev_mod.f90
./src/glas_alt/ElevMgr_mod.f90
./src/glas_alt/GLAS_Alt.f90
./src/glas_alt/WFMgr_mod.f90
./src/glas_atm/AtmMgr_mod.f90
./src/glas_atm/GLAS_Atm.f90
./src/glas_l0p/GLAS_L0proc.f90
./src/glas_l1a/GLAS_L1A.f90
./src/glas_l1a/L1AMgr_mod.f90
./src/glas_l1a/L1A_Granule_mod.f90
./src/glas_l1a/WriteL1A_mod.f90
./src/glas_tick/GLAS_Tick.f90
./src/l1a_lib
./src/l1a_lib/L_Atm_mod.f90
./src/l1a_lib/L_Att_mod.f90
./src/l1a_lib/L_EngCorr_mod.f90
./src/l1a_lib/L_GeoLoc_mod.f90
./src/l1a_lib/Makefile
./src/l1a_lib/QAP03_mod.f90
./src/l1a_lib/align_prap_mod.f90
./src/l1a_lib/fix_siru_vtcw_mod.f90
./src/l1a_lib/swap_lrs_sub_mod.f90
./src/l1a_lib/vers_l1a_mod.f90
./src/prod_util/scf_prod_readers/README
./src/prod_util/scf_prod_readers/prod_common_mod.f90
./src/qapg
./src/qapg/Makefile
./src/qapg/qap06_mod.f90
./src/qapg/qap12_mod.f90
./src/qapg/qap13_mod.f90
./src/qapg/qap14_mod.f90
./src/qapg/qap15_mod.f90
./src/qapg/qapelev_rangecorrections_mod.f90
./src/qapg/qapg_consts_mod.f90
./src/qapg/qapg_elev_mod.f90
./src/qapg/qapg_generate_mod.f90
./src/qapg/qapg_gla05_at.f90
./src/qapg/qapg_gla05_mod.f90
./src/qapg/qapg_gla05_sum.f90
./src/qapg/qapg_readgla_mod.f90
./src/qapg/qapg_specialcases_mod.f90
./src/qapg/qapg_writeqap_mod.f90
./src/reforbit_util/c_procRefOrbit_mod.f90
./src/reforbit_util/rd_reforbcntrl_mod.f90
./src/reforbit_util/reforbit_util.f90
./src/track_reader
./src/waveforms/W_Assess/W_Assess_mod.f90
./src/waveforms/W_Common/W_LsqFit_mod.f90
./src/waveforms/W_FunctionalFt/W_FunctionalFt_mod.f90
./src/wf_lib/Makefile
./src/wf_lib/vers_wf_mod.f90
```